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ADEN PROTECTORATE
ABYAN COTTON EXPERIMENT STATION
PROGRESS REPORT FOR THE SEASON 1952-53

BY

R. R. ANSON.

Introduction.

Planting:—Mid August to mid October.
Picking:—February to May.
Legal close season:—31st May to mid August.
Rainfall:—Too light to warrant recording.
Meteorology:—Favourable growing weather with heavy night dews provided ideal conditions for growing crops. In mid April strong dust-laden wind caused flagging and added considerably to ground pickings. This was more marked at Yeramis than elsewhere.

Rains were slightly later and considerably lighter than usual and the consequent floods smaller and more easily controlled. An area of 20,000 - 21,000 acres was effectively watered; to attain this area, waterings had of necessity to be somewhat restricted and a considerable amount of land in the Southern regions went short. This 20,000 acres was, roughly speaking, divided up in the following proportions—sorghum (mostly Beini) 9,000 acres, effective cotton 9,000 acres, simsim and other crops 2,000 acres. Yields were satisfactory throughout and the cotton produced some very high yields of good grade.

At the time of writing, 9,520,000 lb. of seed cotton have been received at weighing stations from Abyan tenants, an average yield of 1,057 lb. of seed cotton per acre. This has bulked in grade 3. Yeramis and other out-stations between them are expected to produce 1,500,000 lb. of seed cotton.

The final estimate is put at 10,500 bales of 380 lb. (equal to 9,975 bales of 400 lb.). Sowing seed drawn from Yeramis (a pink bollworm free area) was delinted and thoroughly sunned on galvanized iron sheeting before it was issued to tenants. Seed was taken from grades 1 and 2 (mostly grade 1) and germinated excellently.

Cotton Breeding and Propagation.

Nucleus Bulking Area.

A plot of roughly $2\frac{1}{2}$ acres was taken over by the Board from a nearby tenant and used for bulking pure seed. In the centre of this plot one hundred progeny rows were grown. These were produced from

selfed seed harvested from single plants chosen at random from within the commercial crop. The cotton picked from these rows was subsequently analysed, and all rows showing improvement in yield, length and regularity were kept.

In the 1953-54 season a small quantity of seed from the selected progenies will be tested again, and the remaining seed will be bulked to form a new nucleus. This new nucleus will be propagated in isolation to establish a second wave of improved seed following behind the pure bulk produced from the $2\frac{1}{2}$ acre plot.

Yields were very satisfactory (2,282 lb. of seed cotton per acre) and the plot has produced seed sufficient for sowing 250 acres. This, together with the new nucleus, will be grown in isolation at Yeramis.

Breeding Plots (*other varieties*)

Additional progeny rows comprised: —

(1) BAR XL-1 (50 rows). 1st filter from X 1730 blackarm resistant material.
(2) BAR XL-3 (50 rows). A subsequent selection from BAR XL made in the Sudan.
(3) Karnak (100 rows). New introduction from Egypt.
(4) Domains Sakel (50 rows). Introduction from the Sudan.
(5) BLR 14/16 (50 rows). A blackarm and leafcurl resistant Sakel ex Sudan.
(6) BLR 14/25 (50 rows). A further selection from BLR 14/16.
(7) BAR 12/3 (50 rows). A blackarm resistant BP 52 ex Sudan.

" Selfing " was kept up on these progenies for as long as possible throughout the season and satisfactory quantities of self-bred seed have been obtained. All the progenies have been analysed for good lint quality and other desirable characters and the best of them kept for further propagation and analysis.

Karnak.

A small bulking area ($1\frac{1}{2}$ acres) of Karnak was grown in isolation to obtain seed of this variety. 710 lb. of seed were obtained and the seed cotton yield averaged 759 lb. per acre. Karnak is a delicate plant and suffers more severely from wilt (*Rhizoctonia solani*) than most other varieties.

Similarly, a small plot of Wilds Early ($\frac{1}{4}$ acre), grown in isolation on poor land for the same purpose, produced 146 lb. of seed and averaged 889 lb. of seed cotton per acre.

This variety is a very early maturer ($4\frac{1}{2}$ months) and capable of producing two crops in one season. It appears to be highly resistant to wilt, but owing to its large succulent bolls, it is most susceptible to all kinds of bollworm.

Cotton Varietal Tests.

Land set aside for these tests had previously grown sorghum. The surface was rough, undulating and difficult to irrigate.

Eight imported varieties were tested against the commercial control "Abyan" (X 1730A from the Sudan) making nine varieties in all. Sub-plot measurements were 9 × 14 metres (too wide and not long enough for best results) and there were ten replications. The experiment occupied 3·114 acres. It received its first watering on 15th August 1952 but surrounding bunds broke in some places causing considerable water wastage, so much so, that after repairing the bunds it was considered necessary to flood the land a second time on 19th August. The undulating surface of the field caused uneven distribution of water and high land did not become submerged. Sowings were completed by 29th August and a final stand of 95 per cent. obtained by 10th September.

Relevant data from these cotton varietal tests, including the results of tests carried out by the British Cotton Industry Research Association, are presented in Table 1. Both Wilds and BAR 12/3 (BP 52) produced two crops, one from primary and one from secondary growth. They were still yielding cotton when, for purposes of crop hygiene and pest control, they had to be pulled out.

Table 1.

Abyan Cotton Varietal Trials, *1952-53.*

(a) *Seed Cotton and Lint Yields of Varieties.*

Variety	% G.O.T.	Seed Cotton Yields		Corresponding Lint Yields	
		lb. per acre	*% of control*	*lb. per acre*	*% of control*
1. BAR XL-1	36·2	2318	108	841	108
2. BAR XL-3	36·7	2202	103	810	104
3. Abyan Control	36·2	2132	100	773	100
4. Wilds Early	35·6	2198	103	782	101
5. BLR 14/25	32·0	1899	89	608	78
6. Dom. Sakel	33·5	1887	88	633	82
7. BAR 12/3	33·2	2086	97	652	84
8. BLR 14/16	31·9	1737	81	554	71
9. Karnak	34·6	1642	77	569	73
S.E.				± 41·95	

(b) *Spinning Test Results.*

	Eff. Length	*Maturity Ratio*	*Standard Fibre Weight*	*C × S 100's*	*Yarn Appearance*	*H.S.C.*
BAR XL-1	50	0·995	174	2024	2	88
BAR XL-3	50	0·99	162	2090	2	90
Abyan Control	48	1·00	165	1911	3	84
Wilds Early	48	0·86	186	1897	3	77
BLR 14/25	51	0·96	148	2388	3	110
Dom. Sakel	48	0·985	149	2426	4	111
BAR 12/3	45	0·845	153	2046	5	85
BLR 14/16	49	0·96	143	2356	2	110
Karnak	51	0·975	153	2366	2	108

Cotton Pests and Diseases.

Pink Bollworm (*Platyedra gossypiella*).

Towards the end of last season, on the Board's recommendation, strong action was taken to combat pink bollworm. In heavily infested areas cultivators were instructed to uproot and burn all cotton bushes and debris. Sowing seed was drawn from a pink bollworm free district and thoroughly sunned on galvanized iron sheeting for eight hours, in order to kill any pink bollworm larvae which might have found their way into the seed. This somewhat drastic action has proved well worth while and so far no pink bollworm has been reported from any quarter this season. However, notwithstanding this, as a further precaution, sowing seed for season 1953-54 will be given similar treatment.

Sudan Bollworm (*Diparopsis perditor*).

Towards the end of February *Diparopsis perditor* was discovered destroying buds and bolls of cotton varieties on the Abyan experimental area. Further search disclosed the fact that it was also present on the commercial cotton, extending from Giar to Ober Othman. Subsequently, it was found as far afield as Zingibar. There is reason to believe that this pest has spread from Lahej, where Pearson discovered it in January 1951.

American Bollworm (*Heliothis armigera*).

In several areas sporadic attacks of some intensity were discovered during the first week in September. Larvae hatched out on young sorghum and travelled across to the adjoining cotton, destroying cotyledons and checking growth. Prompt application of gammexane dust was an effective control measure.

White Fly (*Bemisia gossypiperda*) *and Asal Fly* (*Aphis gossypii*).

These two pests were common on most cotton fields which had produced heavy vegetative growth. They caused severe "asal" (sticky secretion expelled from resin glands and nectaries or brought about by aphis) and encouraged sooty mould and leaf shed.

Leafrim Blight (*Fungus*).

This unidentified disease attacks the rim of the leaves and gives the appearance of a severe scalding; it rapidly spreads from the rim to the centre of the leaf causing it to curl inwards and finally shed. In severe cases it spreads to the bract and the boll of the cotton plant, leaving a dry scalded appearance and promoting premature boll opening and subsequent loss in grade.

Leaf Spot (*Cercospora gossypina*).

Some cotton developed severe leaf spot which ultimately caused leaf shed, but it was at no time as severe as the "leaf rim blight" described above. Both these diseases were more severe at Ahwar than elsewhere.

Other Crops.

Sorghum Varietal Tests.

The sorghum tests occupied land which had been cropped with cotton in the previous year. Unfortunately, owing to unskilled watering, one of the bunds of the adjoining fields broke and allowed a large head of water, 1 metre deep, to sweep diagonally across the sorghum field, taking with it most of the surface soil. This was reflected to a marked degree in the growth of the crop; it remained stunted throughout the affected area and yielded badly.

Rows were spaced one metre apart; plants were 70 cm. apart in the rows, and were subsequently thinned to 3 per hill. There were nine rows to each sub-plot.

The varieties tested included two local varieties, Beini and Zaar. Beini, being the more popular, was used as control. There were 10 replications and the whole experiment occupied 1·57 acres. Seed was sown on 28th August. All data are shown in Table 2.

Table 2.

Variety	*Yield per acre*		*Percentage of control*	
	Grain	*Gassab*	*Grain*	*Gassab*
Aklamoi early (ex Sudan)	985	6301	150	130
Aklamoi late (ex Sudan)	839	8943	133	185
Dwarf Hagari (ex America)	1040	5405	165	112
Local Beini (control)	629	4811	100	100
Zaar local (Yemen Seed)	569	7408	90	153
S.E.	48·88			

After cutting, a ratoon (second crop) bore fruit but the grain weights have not been recorded here because the yields of some varieties were greatly depreciated by hungry nocturnal thieves. In grain yields, however, the dwarf Hagari was again an easy winner. The daylight thieves comprised small finches and weaver birds, both of which showed preference for Beini and Aklamoi late.

Combined weights of 1st cuttings and ratoons per acre.

1. Aklamoi late ... = 9569 lb. = 4·27 tons.
2. Zaar ..... = 9061 „ = 4·04 „
3. Aklamoi early ... = 6879 „ = 3·07 „
4. Dwarf Hagari ... = 6574 „ = 2·93 „
5. Beini control ... = 5654 „ = 2·52 „

Pigeon Pea (*Cajanus indicus*).

Two varieties, West Indian white seeded and Central Indian red seeded, were grown in observation plots (each plot measured exactly 3 acres). Both varieties were imported from the Sudan. Unfortunately the seed had been slightly mixed before it reached this station. It will need careful selection to put it right; this selection work has been put in hand.

Seed was sown on 26th and 27th August 1952, after flooding. Germination was excellent and growth luxuriant, plants finally averaging 7 feet high.

The Central Indian red seeded appeared to be the better variety and gave a higher yield. There were five definite pickings. Final yields of shelled grain were: West Indian white, 4599 lb., Central Indian red, 6375 lb. This is somewhat surprising when we realise that the average yield of this crop in other places is 600 lb. per acre. Grown in combination with Lubia (*Dolichos lablab*), this crop should fit in well in a rotation—cotton—sorghum—pigeon pea—cotton; the bushes make good fodder for livestock.

Lubia (*Dolichos lablab*).

Lubia was grown for seed and occupied areas around the edges of experiments. Planted towards the end of August, it germinated well. Spacings were made too far apart for it to form a complete cover; this error will be rectified in the 1953-54 season. Two thousand pounds of seed have been picked.

Two varieties were grown, white flowered and purple flowered. Of the two, the white was the better yielder, made better growth and seemed much hardier.

Maize (*Zea*).

A small observation plot of white seeded maize (Hickory King) was sown for seed. One flooding was found to be insufficient to bring it to maturity and it was found necessary to give it three more irrigations. Yields were good and 445 lb. have been saved for sowing next year.

Castor Oil.

The following varieties were imported from the Sudan and grown for seed:—(1) Nadiad, (2) Punjab 809, (3) Kagelu black, (4) Punjab C 3, (5) Kagelu spotted, (6) Hindi 12.

All six varieties made good growth and a quantity of seed has been retained for future requirements.

Beans.

Both green and black seeded varieties of Mung (*Phaseolus mungo*) grew successfully. Tepary beans (white seeded) grew remarkably well on one watering and yielded a quantity of seed. However, the more popular French and haricot beans did not survive on one watering and soya beans failed to germinate.

Dwarf Cavendish Bananas (*Musa sinensis*).

Four hundred and fifty-two suckers of this Chinese variety were set out on the quincunx method at 12 foot intervals. These bananas were imported from Asmara and are thought to be wind resistant. Waterings have been given at 4-day intervals.

Apart from a form of rust, which has spotted the leaves to some extent, they are all doing well and making good growth.

For observation purposes a further two hundred and fifty suckers were set out on more alkaline and less fertile soil. They are not making good progress.

Vegetable Garden and Tree Nursery.

Roughly one acre of land was set aside for vegetables and ornamental trees. The water required for this was pumped from the well used for domestic supplies and in order to prevent, as far as possible, any interruption to and restriction of the domestic supply, a small concrete reservoir was constructed.

On the whole this garden has been a success. Tomato, carrot, onion, cabbage and chilli crops were particularly good, but cauliflowers failed to set.

Numerous ornamental trees have been raised from seed and planted out on various sites.

Conclusion.

Of the cotton varieties tested to date, X 1730 types seem best suited to Abyan conditions. Wilds Early and BP 52 would probably outyield these types if given closer spacing and allowed to form secondary growth. This, however, might be a dangerous practice because there would be some difficulty in persuading tenants to uproot their cotton at the appointed time (decided upon by the Board) if it were still producing a crop, and an adequate close season might be difficult to enforce.

In the cotton breeding programme, the propagation of pure seed should be given priority. Close inspection disclosed the fact that a high proportion of rogues have become intermingled with the commercial crop, (0·67%). If steps were not taken to replace the present

commercial seed by new waves of pure seed, as they became available each year, the proportion of foreign cotton would become higher and higher, until eventually the commercial crop would degenerate considerably and the market value would fall accordingly.

On the Experiment Station the existing system of flooding fields leaves room for improvement. At present, in many instances, water comes on to the field at too great a pace, much top soil is washed away, and many small gullies and channels are left behind. Smaller canals controlled by gates and spill ways, leading off the main canal, might effect an improvement.

As far as the other crops are concerned, pigeon pea and Lubia (*Dolichos lablab*) might work in as a useful rotation crop with sorghum and cotton, whilst onions and chillies should prove paying field crops if grown under irrigation, when the tube well scheme has been completed.

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